REMARKS

Claims 1, 7, 12, 18, 23, 26, 30, 31-32, 35, 37-38, 41, 42, 44, 49, 51, 53, 58, 59, 61 and 66 have been amended. Claims 8-9 and 19-20 have been cancelled. No new matter has been added. Claims 1-7, 10-18 and 21-67 remain pending in the application. Applicants respectfully request reconsideration in view of the foregoing amendments and these remarks.

I. Drawing Objections

The Examiner objected to the drawings, noting that the resistor connected between the collector of transistor Q_2 and the power source V_{DD} in the biasing network of Fig. 3 was not labeled. Applicants have amended Fig. 3 to label the resistor as R3. Accordingly, Applicants believe that the drawings as presented are in compliance with 37 CFR 1.83 and respectfully request withdrawal of the objection.

II. Allowable Subject Matter

Applicants wish to thank the Examiner for noting that claims 9 and 20 were merely objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Examiner acknowledged that "claims 9 and 20 would be allowable over the art of record because the prior art does not teach a programmable peak detection circuit as set forth in the claimed invention." Applicants have amended claims 7 and 18 as independent claims that include the peak detection circuitry limitation of claims 9 and 20. Therefore, Applicant respectfully submits that claims 7 and 18 are in condition for allowance.

III. 35 U.S.C. § 103 Rejections

A. The Examiner rejected claims 1-3, 7, 8, 10, 12-14, 18, 19, 21, 23, 25-28, 30-42, 44-49, 51, 53-56, 58, 59, 61-64 and 66 under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 5,150,075 (hereinafter referred to as "Hietala") in view of U.S. Patent No. 6,388,525 B1 (hereinafter referred to as "Bien"). Applicants respectfully traverse this rejection.

a. Claim 1 and its dependent claims

Claim 1 is directed to a protection circuit for a radio frequency (RF) power amplifier. The protection circuit includes shunt circuitry that shunts an RF input signal to AC ground. The

shunt circuitry includes a shunt switch controlled by control circuitry that shunts the RF input signal to AC ground and releases the RF input signal from AC ground. The control circuitry includes ramp circuitry that controls the shunt switch so that the shunt switch releases the RF input signal from AC ground for input to an RF amplifier. The control circuitry further includes a delay stage so that the shunt circuitry continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event.

The Examiner acknowledges that Hietala does not disclose Applicants' claimed shunt circuitry and shunt switch. However, the Examiner suggests that Bien discloses shunt circuitry including a shunt switch. The Examiner further suggests that Bien's shunt switch "would be controlled by control circuitry." Applicants respectfully disagree. Applicants respectfully assert that Bien does not teach or suggest, at least, control circuitry including a delay stage so that the shunt circuitry continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event.

Bien shows a linear amplifier circuit having a variable signal gain. The overall gain of Bien's circuit is determined by the values of variable shunt and feedback impedances and by the signal gain of an amplifier. (Abstract). Transistor M21 serves as the variable shunt impedance that connects the input of the amplifier to a signal reference voltage. (Col. 4, lines 2-5; col. 7, lines 9-13). A control voltage Vcon is applied directly to the gate of transistor M21, thereby controlling the operation of M21 and varying the effective shunt impedance. (Col. 7, lines 40-49; Fig. 7). Vcon is a DC control voltage that is derived as a function of the magnitude of the input voltage (i.e., Vcon can be produced by rectifying and filtering input signal Vin). (Col. 6, lines 48-56). Therefore, transistor M21 is configured to be continually conducting in response to an applied Vcon, and it operates as a resistor having an effective impedance "in accordance with the magnitude of the control voltage Vcon." (Col. 7, lines 43-45).

Applicants respectfully assert that Bien fails to teach or suggest, at least, control circuitry including a delay stage so that the shunt circuitry continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event. As described above, Bien's shunt transistor M21 is continually conducting in response to the applied

DC control voltage Vcon. Bien does not show control circuitry that includes a delay stage, i.e., circuitry that shunts the input signal to ground until after the power amplifier has turned back on. Rather, transistor M21 *continually* shunts the input signal to ground while an input signal is applied to the circuit, and Bien's control signal serves only to vary the effective impedance provided by transistor M21. Accordingly, Applicants respectfully submit that claim 1 is allowable for at least the above reasons.

Claims 2-3, 8 and 10 depend from claim 1 and are allowable for at least the same reasons set forth above with respect to claim 1.

b. Claim 7

Claim 7 is directed to a protection circuit for an RF power amplifier. The protection circuit includes shunt circuitry, bias shutdown circuitry, and peak detection circuitry. The shunt circuitry shunts an RF input signal to AC ground and includes a shunt switch and control circuitry. The control circuitry includes ramp circuitry to control the shunt switch so that the shunt switch releases the RF input signal from AC ground for input to an RF amplifier. The bias shutdown circuitry shuts off a bias voltage or a bias current being supplied to an output transistor of the RF power amplifier. The peak detection circuitry monitors an output voltage of the RF amplifier and provides a protection signal to the shunt circuitry and the bias shutdown circuitry when the output voltage of the RF amplifier exceeds a threshold voltage level that is programmable through the peak detection circuitry.

As described above, Claim 7 recites peak detection circuitry that provides a protection signal to the shunt circuitry and the bias shutdown circuitry when the output voltage of the RF amplifier exceeds a threshold voltage level, wherein the threshold voltage level is programmable through the peak detection circuitry. The Examiner acknowledged that the prior art does not teach Applicants' claimed programmable peak detection circuit. Therefore, Applicants respectfully submit that claim 7 is allowable for at least the above reasons.

c. Claim 12 and its dependent claims

Claim 12 is directed to a protection circuit for an RF power amplifier. The protection circuit includes shunting means for shunting the RF input signal to AC ground and releasing the

RF input signal from AC ground. The shunting means is controlled by control means. The control means controls the shunting means so that the shunting means releases the RF input signal from AC ground for input to an RF amplifier. The control means includes a delay means so that the shunting means continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event.

Claim 12 is allowable for at least the same reasons set forth above with respect to claim 1.

Claims 13-14, 19 and 21 depend from claim 12 and are allowable for at least the same reasons set forth above with respect to claim 12.

d. Claim 18

Claim 18 is directed to a protection circuit for an RF power amplifier. The protection circuit includes shunting means, control means, biasing means, and detecting means. The shunting means shunt the RF input signal to AC ground and release the RF input signal from AC ground. The shunting means are controlled by control means. The biasing means shut off a bias voltage or a bias current being supplied to an output transistor of the RF power amplifier. The detecting means monitor an output voltage of the RF amplifier and provide a protection signal to the shunting means and the biasing means when the output voltage of the RF amplifier exceeds a threshold voltage level that is programmable through the detecting means.

Claim 18 is allowable for at least the same reasons set forth above with respect to claim 7.

e. Claim 23 and its dependent claims

Claim 23 is directed to an RF power amplifier that includes amplifier circuitry, peak detection circuitry, and a bias network. The amplifier circuitry amplifies an RF input signal and provides an amplified RF output signal. The peak detection circuitry monitors the amplified output RF signal and detects when the amplified output signal exceeds a threshold voltage level that is programmable through the peak detection circuitry. The bias network provides a bias to the amplifier circuitry and shuts off the bias to the amplifier circuitry when the peak detection circuitry detects that the amplified output signal has exceeded the threshold voltage level.

Claim 23 recites that the threshold voltage level is programmable through the peak detection circuitry. As noted above, the Examiner acknowledged that the prior art does not teach Applicants' claimed programmable peak detection. Therefore, Applicants respectfully submit that claim 23 is allowable.

Claims 25-28 and 30 depend from claim 23 and are allowable for at least the same reasons set forth above with respect to claim 23.

f. Claim 31 and its dependent claims

Claim 31 is directed to a method for protecting an RF power amplifier that includes programmably setting a threshold voltage level for peak detection, detecting an output voltage of an RF power amplifier exceeding [a] the threshold voltage level, shutting off bias to an output transistor of the RF power amplifier when the output voltage exceeds the threshold voltage level, and turning off the output transistor of the RF power amplifier when the output voltage exceeds the threshold voltage level.

Claim 31 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 32-36 depend from claim 31 and are allowable for at least the same reasons set forth above with respect to claim 31.

g. Claim 37 and its dependent claims

Claim 37 is directed to a protection circuit for an RF power amplifier that includes means for detecting an output voltage of an RF power amplifier exceeding a threshold voltage level, means for shutting off bias to an output transistor of the RF power amplifier when the output voltage exceeds the threshold voltage level, and means for turning off the output transistor of the RF power amplifier when the output voltage exceeds the threshold voltage level. The detecting means include means for programmably adjusting the threshold voltage level.

Claim 37 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 38-41 depend from claim 37 and are allowable for at least the same reasons set forth above with respect to claim 37.

h. Claim 42 and its dependent claims

Claim 42 is directed to a wireless transceiver including an RF power amplifier that includes amplifier circuitry, peak detection circuitry, and a bias network. The amplifier circuitry amplifies the RF input signal and provides an amplified RF output signal. The peak detection circuitry monitors the amplified output RF signal and detects when the amplified output signal exceeds a threshold voltage level that is programmable through the peak detection circuitry. The bias network provides a bias to the amplifier circuitry and shuts off the bias to the amplifier circuitry when the peak detection circuitry detects that the amplified output signal has exceeded the threshold voltage level.

Claim 42 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 44-49 depend from claim 42 and are allowable for at least the same reasons set forth above with respect to claim 42.

i. Claim 51 and its dependent claims

Claim 51 is directed to an RF power amplifier that includes amplifying means, detecting means, and biasing means. The amplifying means amplify an RF input signal and provide an amplified RF output signal. The detecting means monitor the amplified output RF signal and detect when the amplified output signal exceeds a threshold voltage level. The detecting means include programmable means for setting the threshold voltage level. The biasing means provide a bias to the amplifying means and shut off the bias to the amplifying means when the detecting means detects that the amplified output signal has exceeded the threshold voltage level.

Claim 51 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 53-56 and 58 depend from claim 51 and are allowable for at least the same reasons set forth above with respect to claim 51.

j. Claim 59 and its dependent claims

Claim 59 is directed to a wireless transceiver that includes an RF power amplifier. The RF power amplifier includes amplifying means, detecting means, and biasing means. The

amplifying means amplify the RF input signal and provide an amplified RF output signal. The detecting means monitor the amplified output RF signal and detect when the amplified output signal exceeds a threshold voltage level. The detecting means include programmable means for setting the threshold voltage level. The biasing means provide a bias to the amplifying means and shut off the bias to the amplifying means when the detecting means detects that the amplified output signal has exceeded the threshold voltage level.

Claim 59 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 61-64 and 66 depend from claim 59 and are allowable for at least the same reasons set forth above with respect to claim 59.

B. The Examiner rejected claims 23, 24, 31, 37, 42, 43, 50, 51, 52, 59, 60 and 67 under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 6,720,831 B2 (hereinafter referred to as "Dening"). Applicants respectfully traverse this rejection.

Applicants respectfully assert that Dening does not teach or suggest, at least, a threshold voltage level that is programmable through the peak detection circuitry, as recited by claim 23. Dening shows a power amplifier that includes a sensing circuit and a processing circuit to detect peaks in the amplifier output voltage. (Abstract). If the processing circuit detects that the output voltage peaks exceed a predetermined threshold level, the processing circuit reduces the bias provided to the power amplifier. (Col. 1, lines 55-61). The predetermined output voltage threshold is fixed at a level below the voltage at which "extended operation would cause burnout of the power amplifier." (Col. 3, lines 27-31). Dening does not show a threshold voltage level that is programmable through the peak detection circuitry; rather, Dening's voltage threshold is *predetermined* to correspond to a particular voltage that lies within the amplifier's safe operating range. Therefore, Applicants respectfully submit that claim 23 is allowable over Dening.

Claim 24 depends from claim 23 and is allowable for at least the same reasons set forth above with respect to claim 23.

Claim 31 is allowable for at least the same reasons set forth above with respect to claim 23.

Claim 37 is allowable for at least the same reasons set forth above with respect to claim 23.

Claim 42 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 43 and 50 depend from claim 42 and are allowable for at least the same reasons set forth above with respect to claim 42.

Claim 51 is allowable for at least the same reasons set forth above with respect to claim 23.

Claim 52 depends from claim 51 and is allowable for at least the same reasons set forth above with respect to claim 51.

Claim 59 is allowable for at least the same reasons set forth above with respect to claim 23.

Claims 60 and 67 depend from claim 42 and are allowable for at least the same reasons set forth above with respect to claim 42.

C. The Examiner rejected claims 4-6, 11, 15-17, 22, 29, 48, 57 and 65 under 35 U.S.C. § 103(a) as allegedly unpatentable over Hietala in view of Bien, and in further view of U.S. Patent No. 6,603,335 (hereinafter referred to as "Macphail"). Applicants respectfully traverse this rejection.

As discussed above, the Examiner has not established that the combination of Hietala and Bien teaches or suggests all of the claimed elements of Applicants' invention. In particular, the Examiner has not shown that the combination of Hietala and Bien shows, at least, Applicants' claimed control circuitry including a delay stage so that the shunt circuitry continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event. Applicants respectfully assert that Macphail does not cure this deficiency.

Macphail is directed to a power amplifier control circuit for use in wireless applications. (Col. 1, lines 6-9). Fig. 1 of Macphail shows a ramp control circuit configured to accept an input enable voltage, Ven, and provide a supply voltage, Vcc, for a power amplifier. (Col. 3, lines 50-54; Fig. 1). The control circuit includes an RC circuit in order to provide a supply voltage that

has gradual rising and falling switching edges. (Col. 1, lines 62-64; Fig. 1). When Ven is applied to the input port, the RC circuit causes a delayed output voltage to appear at the output port. (Col. 3, lines 56-58). The amount of delay depends on the time-delay constant of the RC network, i.e., on the fixed values chosen for the resistor and capacitor of the RC circuit. (Col. 3, lines 58-60). Macphail does not show a delay stage where shunt circuitry continues to shunt the RF input signal to AC ground until after the RF power amplifier has turned back on after a shutdown event. Rather, Macphail's "delay circuitry" operates to provide a *supply voltage* to the power amplifier. Therefore, Applicants respectfully assert that Macphail does not teach or suggest Applicants' claimed control circuitry including a delay stage.

Claims 4-6 and 11 depend from claim 1 and are allowable for at least the same reasons set forth above with respect to claim 1.

Claims 15-17 and 22 depend from claim 12 and are allowable for at least the same reasons set forth above with respect to claim 12.

Claim 29 depends from claim 23 and is allowable for at least the same reasons set forth above with respect to claim 23.

Claim 48 depends from claim 42 and is allowable for at least the same reasons set forth above with respect to claim 42.

Claim 57 depends from claim 51 and is allowable for at least the same reasons set forth above with respect to claim 51.

Claim 65 depends from claim 59 and is allowable for at least the same reasons set forth above with respect to claim 59.

IV. Conclusion

Applicants petition for an extension of time to respond to the instant action up to and including January 7, 2007. A submission of Credit Card Payment Request authorizing the above fee is enclosed. Please apply any other required fees, deficiency in fees or any credits to deposit account 06-1050, referencing the attorney docket number shown above.

Respectfully submitted,

Date: 1/4/07

David Gan Reg. No. 39,609

Mark D. Kirkland
Reg. No. 40,048

Customer No. 26200
Fish & Richardson P.C.
500 Arguello Street, Suite 500
Redwood City, California 94063
Telephone: (650) 839-5070
Facsimile: (650) 839-5071

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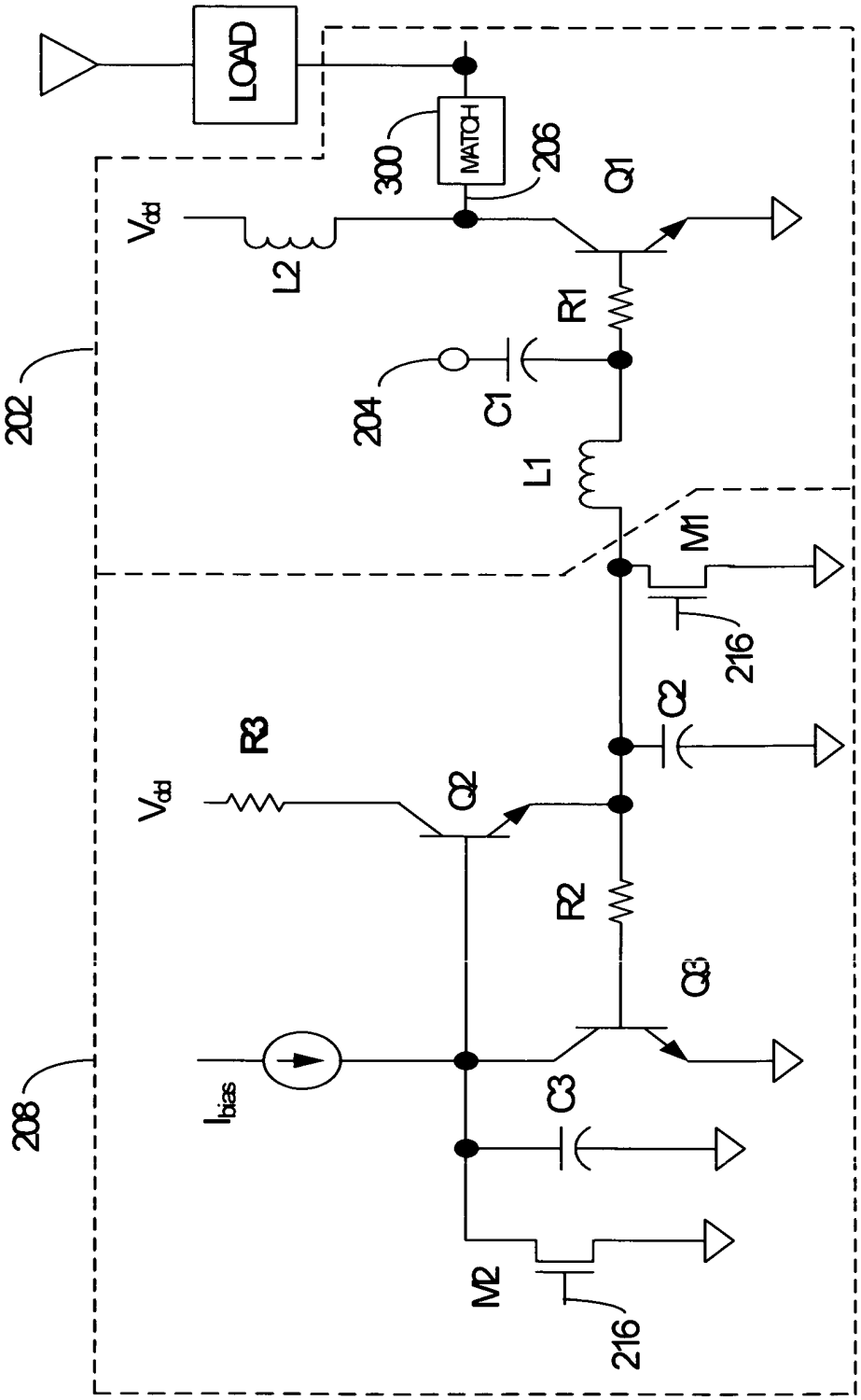
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R2
Q3
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C3
M2
216
208

FIG 3